J. H. MARTIN.

CURRENT MOTOR.

APPLICATION FILED NOV. 22, 1911.

1,025,002.

Patented Apr. 30, 1912.

3 SHEETS—SHEET 1.

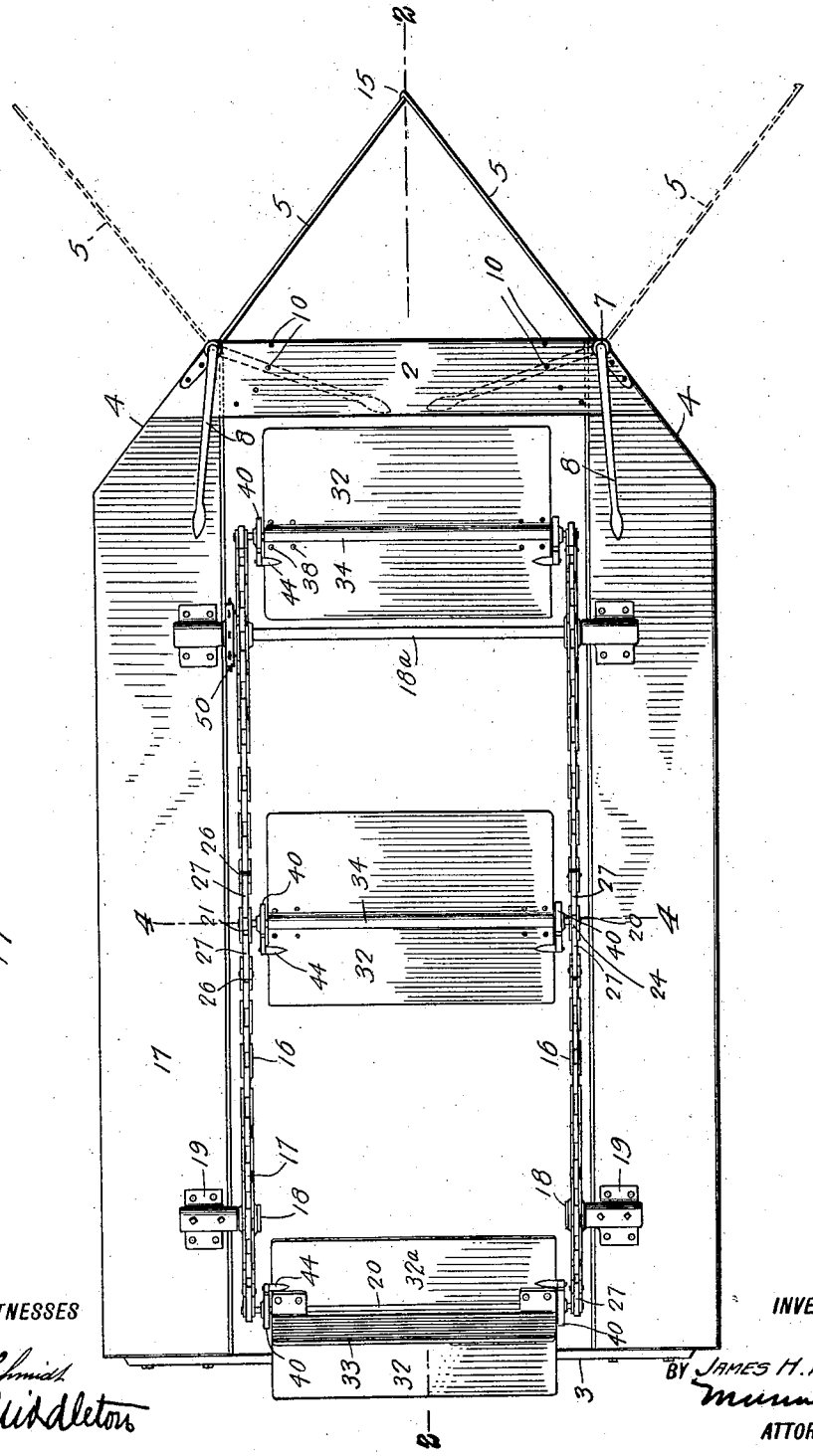

Fig. 1.

WITNESSES

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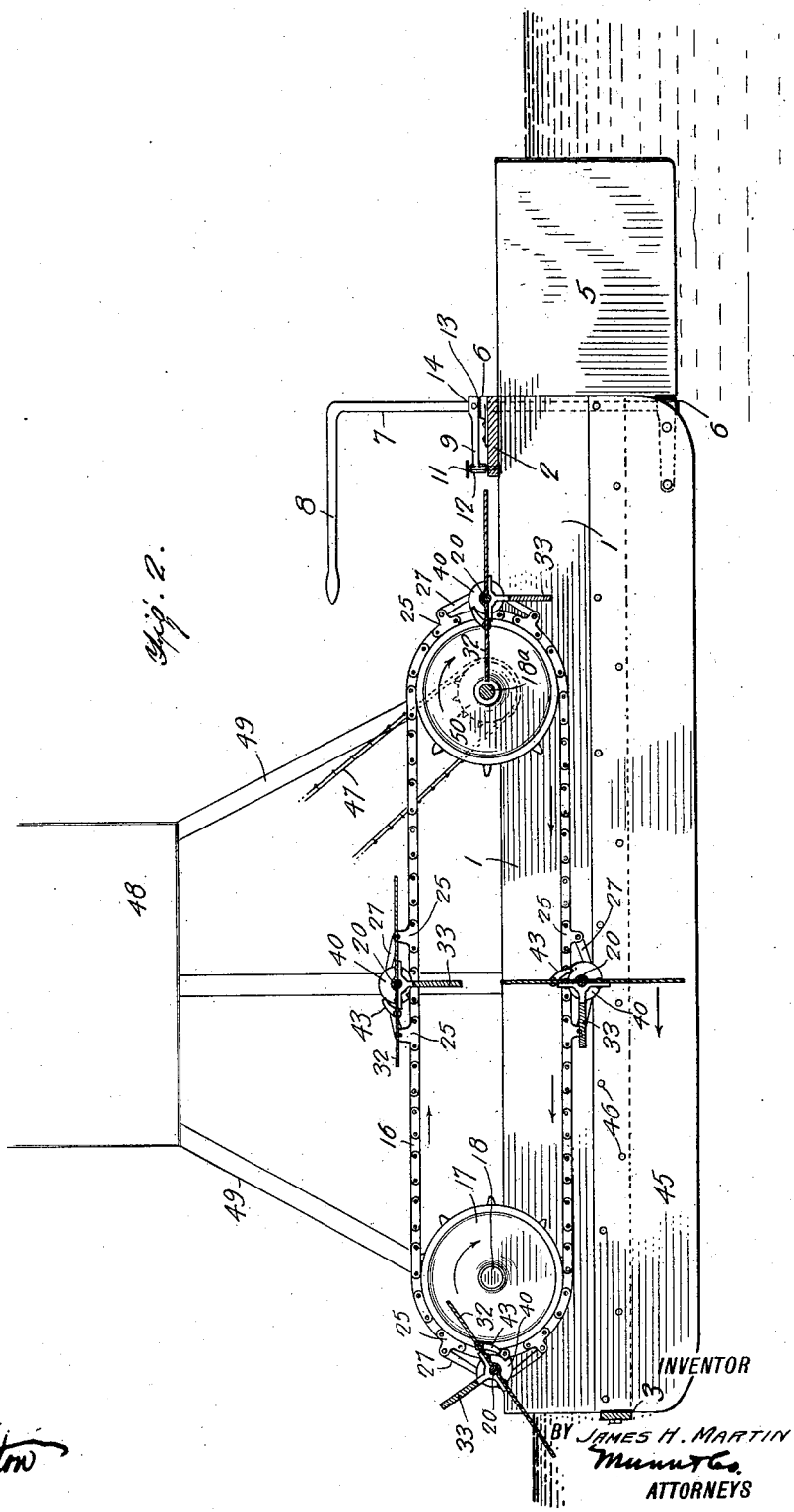
3 SHEETS—SHEET 2.

Fig. 2.



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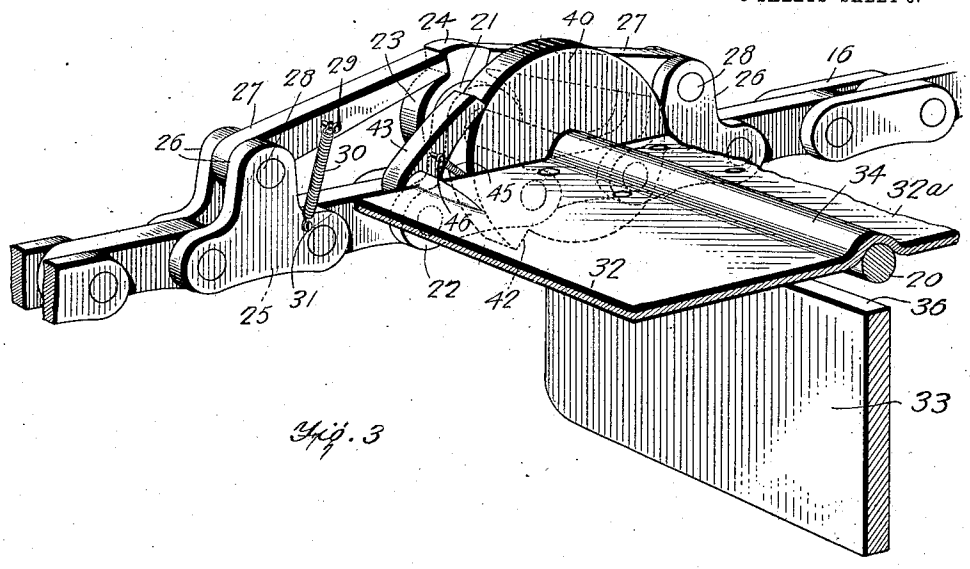


Fig. 3

Fig. 4.

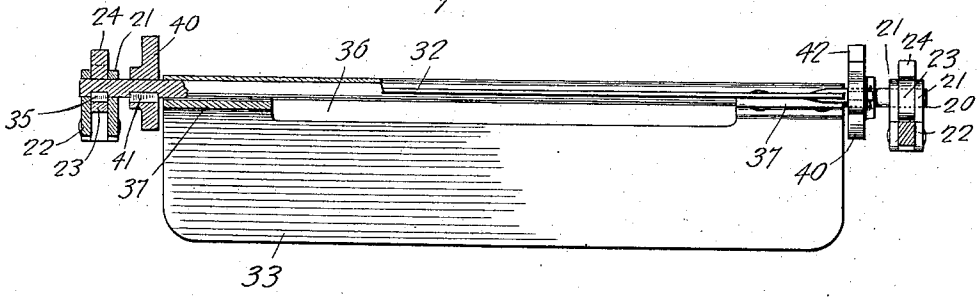
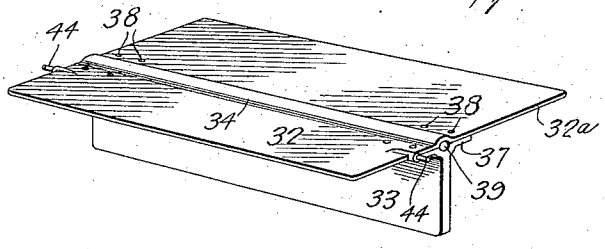


Fig. 5.



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CURRENT-MOTOR.

1,025,002. Specification of Letters Patent. Patented Apr. 30, 1912.

Application filed November 22, 1911. Serial No. 661,662.

To all whom it may concern:

Be it known that I, JAMES H. MARTIN, a citizen of the United States, and a resident of Springfield, in the county of Greene, State of Missouri, have invented a new and useful Improvement in Current-Motors, of which the following is a specification.

My invention is an improvement in current motors, and has for its object the provision of a simple, economical motor of the character specified adapted to be arranged in a running stream or the like, and wherein means is provided for utilizing the force generated by the moving water with as little waste from friction as possible.

A further object is to provide a flume in connection with the motor for deflecting a large amount of the current to the motor, and having means for shutting off the motor from the current, and for deflecting driftwood and the like away from the motor.

In the drawings; Figure 1 is a top plan view of the improvement; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is an enlarged perspective view of a portion of the chain, showing the mounting of the vanes; Fig. 4 is a section on the line 4—4 of Fig. 1; and Fig. 5 is a perspective view of a vane.

In the present embodiment the motor proper is supported by buoyant floats or boats, each of which consists of a hollow casing 1 of suitable length and cross section arranged in laterally spaced parallel relation, and connected at front and rear by cross plates 2 and 3, respectively. The floats have their front ends beveled on their outer sides, as indicated at 4, and the plate 2 is arranged on the upper faces of the floats, while plate 3 is at their rear ends.

A pair of gates are provided for closing the space between the floats at their front ends, each gate consisting of a plate 5 hinged to the adjacent float by one end at top and bottom by hinges 6. A shaft 7 forms the pivot pin connecting the leaves of the hinges, and the shaft is extended above the upper face of the floats and is bent laterally to form a handle 8. Each shaft 7 is provided with a radial arm 9 adjacent to the plate 2, and the said plate is provided with an arc-shaped series 10 of openings near each shaft for engagement by a pin 11 passing through a bearing sleeve 12 at the outer end of the arm. Each arm is provided with a hub 13 encircling the shaft, and a pin 14 is passed through the sleeve and engages the shaft to hold the sleeve in adjusted position on the shaft. By means of the handles 8 the gates 5 may be swung into the full line position of Fig. 1 to close the flume formed by the floats, or may be swung into the dotted line position of the same figure to permit free passage to the water to operate the motor. One of the gates is provided at its outer end with a transverse rib 15 which fits outside of the adjacent end of the other gate. The pin 11 is slidable in the bearing 12, so that it may be engaged with any of the openings, and the aggregate length of the gates is greater than the width of the space between the floats, so that the gates form a peak when closed. The peak acts as a fender to deflect driftwood or the like to the outer sides of the floats. The beveled front ends of the floats assist also in this function.

When the gates are in the dotted line position of Fig. 1 they act as deflectors, to deflect the moving water into the flume to operate the motor. The motor consists of a pair of endless chains 16, a chain being supported alongside the inner face of each float on sprocket wheels 17. The sprocket wheels at the rear ends of the floats are arranged on alined stub shafts 18, and those at the front ends of the floats are secured to a shaft 18ª. The shafts 18 and 18ª are journaled in bearings 19 on the floats, and the chains may be of any usual or desired construction of link. The chains are connected at spaced intervals by means of transverse shafts 20, each shaft having each of its ends journaled in a pair of bearing lugs 21 formed on special links 22 interposed in the chains 16. The members of each pair of lugs 21 are spaced apart laterally, and a disk 23 is secured to the shaft between the members of each pair of lugs. Each of the disks 23 is provided with a lug 24 extending outwardly, and the side edges of each lug are radial to the shaft or to the center of the disk. A special form of link 25 is arranged in each side of each link 22, each of the said links 25 having a pair of spaced bearing lugs 26. A pawl 27 is pivoted at one end between each pair of lugs, and the free end of each pawl engages the adjacent

side of the lug 24. Each pawl 27 is pivoted on a pin 28, connecting the lugs 26, and is provided with a laterally extending pin 29 intermediate its ends. A coil spring 30 has one end connected to the pin 29 and the other end to a pin 31 on the link 25. The spring acts to draw the free end of the pawl toward the chain to hold the said end in engagement with the lug 24.

The chains 16 in the present instance are shown as formed of alternately arranged single links and pairs of links, and the special link 25 is composed of laterally spaced bars, and a lug 26 is integral with each bar. The link 22 is of precisely the same construction as the link 25. The length of the pawls 27 is such that when the links 22 and 25 of the chain are in alinement, that is, when the chain is straight, the pawls 27 hold the lug 24 rigidly between them so that the shaft 20 cannot move angularly. When, however, the chain passes around the sprocket wheels 17 the links 22 and 25 are moved angularly with respect to each other, and the free ends of the pawls are moved away from the lug 24. The shaft is thus free to move angularly at the sprockets, without interference from the pawls. This movement is permitted to prevent any kinking, twisting or binding of the chains or shafts 20 as the said shafts move around the sprocket wheels at the respective ends of the motor. Each shaft 20 supports a vane, and each vane is composed of three wings or sections, two of which, 32 and 32^a, are in alinement, and the third, 33, perpendicular to the alined sections. The alined sections of the vane are composed of a plate of suitable sheet material of a length somewhat less than the distance between the chains, and of suitable width, and the plate has a longitudinal groove 34 for receiving the shaft 20 at one side of the longitudinal center of the plate.

The side edge of section 33 of the vane adjacent to the shaft is cut away intermediate the ends of the vane, as indicated at 36, to form a vent for the escape of water, and at each end of the said side edge the vane is provided with oppositely extending lateral flanges 37 which fit against the adjacent faces of sections 32 and 32^a and are secured to the said sections by rivets or bolts 38. The side edge of the section is also grooved at 39 between the flanges to receive the shaft, and the vane as a whole is rotatable on the shaft. Each disk 23 (Fig. 4) is held to the shaft 20 by a key 35, and a disk 40 is keyed to the shaft by a key 41 between each disk 23 and the adjacent end of the vane. Each disk is cut away to form a radial stop 42 in its periphery, and each stop is adapted to engage the end of a pawl 43. The pawl 43 is provided with a bearing at one end fitting over a pin 44, extending longitudinally from the end of section 32 of the vane, and a spring 45 is arranged between a pin 46 on the pawl and the vane and acts normally to hold the free end of the pawl in contact with the periphery of disk 40.

The portion 32^a of the vane is of greater width than the portion 32, as will be noticed from an inspection of Fig. 2, and the stop 42 is so arranged with respect to the vane that when the portions 32—32^a of the vane are in vertical position, with the portion 32^a below the shaft 20, the pawl will be in engagement with the stop to prevent the portion 32^a from swinging forward of the shaft 20. The mechanism is so arranged that on the lower runs of the chains the vane sections 32 and 32^a will be approximately submerged, and since the portion 32^a is of greater area and below the shaft the force of the current will tend to move the portion 32^a at a greater speed than the portion 32 and to swing the alined sections out of vertical position. The pawl, however, prevents any such movement and holds the vane vertical and in a position to expose the greatest possible area to the current. It is, of course, desirable to hold the vanes in a position such that the current acts upon the greatest possible area of vane for the longest possible extent of time, and to offer as little surface to the resistance of the air on the return movement of the vanes. It is also desirable to enter and remove the vanes from the water with as little resistance to the flow of the water as may be, since every such resistance requires power to overcome it and detracts so much power from that delivered by the motor. For this reason, the vanes are returned on the upper run of the chains with the sections 32—32^a in horizontal position.

As the vanes move around the sprocket wheels at the rear of the floats the heavier portions 32^a and 33 of the vane swings the said vane into position with the portion 33 approximately vertical. The said portion, it will be noticed, is of greater thickness than the portions 32—32^a. The pawl 43 offers no resistance to this movement, since it is moved away from the stop, and the pawls 27 are moved away from lug 24 by the angular movement of the links with respect to each other. The vanes thus return, on the upper runs of the chains, with the portions 32—32^a approximately horizontal, and offer as a consequence but little resistance to the air. As they pass around the sprocket wheels at the front of the floats the levers 27 are again loosened, and as soon as section 33 of the vane is engaged by the current, which is when the shaft 20 approaches the common plane of the axes of the sprocket wheels, the vane is swung with portions 32—32^a vertical. The vanes, when on the lower run of the chains, extend below the

bottoms of the floats, and a plate 45 is secured to each float, on the inner side thereof, by rivets or bolts 46, the said plates extending somewhat below the lower edges of the vanes. The operation of the motor may be stopped whenever desired, by closing the gates, and the said gates prevent any damage to the motor when not in use from driftwood or the like. The power generated by the motor is taken from the shaft 18ª by means of a chain 47 connected to a generator or the like arranged in a casing 48 supported by standards 49 above the motor, the chain engaging a sprocket wheel 50 on shaft 18ª.

It will be noted from an inspection of Fig. 2 that four vanes are provided, so that at least one vane is in the water at all times. The shafts 20 are spaced apart at equal distances, and the chains are of such length that one vane always has its full area exposed to the action of the current. The cut away portion 36 of the section 33 permits the water to flow through as the vane is lifted from the water. It will be understood, that as the vanes pass around the sprocket wheels, the pawls 27 are entirely released from the lug 24, so that the shaft is free to rotate in the chains. The vane 33 is in effect, a counterbalance, and is of sufficient weight to hold the sections 32—32ª of the vane horizontal on the upper run of the chains. As the vanes pass around the sprocket wheels on the stub shafts, the current tends to swing the shaft 20, which at this time is released from the pawls 27, into the position shown at the left of Fig. 2. As soon however as the vane is lifted entirely clear of the water, the section 33 immediately swings the vanes into the position shown on the upper run of the chain in the said figure. As the vanes pass around the sprocket wheels on the shaft 18ª, the section 33 of the vanes is first engaged by the water, and the vane is swung as a whole to cause the section 32ª to enter the water. The current acting on the sections 32ª and 33 will now swing the vane into the position shown on the lower runs of the chains, that is with the sections 32—32ª vertical. This takes place before the vanes have passed away from the sprocket wheels, and the shaft is thus moved into position so that the pawls 27 engage on each side of the lug 24 to hold the shaft rigid on the lower runs of the chains. It will be understood that the shafts 7 are secured to the gate, so that when the shafts are turned the gates move therewith.

I claim:

1. A current motor comprising a flume composed of spaced floats rigidly connected together, a shaft journaled transversely of the floats at the front ends thereof, a stub shaft on the rear end of each float, said shafts being in alinement, a sprocket wheel on each stub shaft, a sprocket wheel at each end of the transverse shaft, an endless chain supported on the wheels adjacent to each float, shafts connecting the chains at spaced intervals, each chain having a link provided with spaced bearing lugs for the adjacent end of the shaft, a disk secured to the shaft between each pair of lugs and provided with a lug on its periphery having its faces radial to the shaft, a pawl pivoted to the adjacent link on each side of the shaft and engaging the lug when the chain links are in alinement, springs holding the pawls in engaging position, a disk on each shaft adjacent to the chain, each disk having a stop having one face radial to the shaft and the other merging gradually into the periphery of the disk, a vane journaled on each shaft between the last named disks, each vane consisting of three sections, two of the sections being in the same plane and on opposite sides of the shaft, one of the sections being of greater width than the other, the third section being at right angles to the first named sections and perpendicular to the axis of the shaft, and a pawl on the vane at each end thereof engaging the notch of the adjacent disk to hold the alined section vertical with the wider section below the shaft and to prevent the said wide section from swinging in front of the shaft.

2. A current motor comprising spaced endless chains, wheels for supporting the chains, shafts connecting the chains at spaced intervals and journaled in the links of the chains, a vane on each shaft, each vane comprising alined sections on opposite sides of the shaft, one of the sections being of greater width than the other, and a section at right angles to the other sections and perpendicular to the shaft, means engaging the shafts for preventing angular movement of the shafts when the links are in alinement and for permitting angular movement when the shafts pass around the wheels, and means for holding the vanes with the alined planes vertical on the lower runs of the chains and with the wide sections below the shafts, said means comprising a disk secured on the shaft at each end of each vane, each disk having a tooth, and a pawl at each end of the narrow section of the alined sections of the vane.

3. A current motor comprising spaced endless chains, wheels for supporting the chains, shafts connecting the chains at spaced intervals and journaled in the links of the chains, a vane on each shaft, each vane comprising alined sections on opposite sides of the shaft, one of the sections being of greater width than the other, and a section at right angles to the other sections and perpendicular to the shaft, and means for holding the vanes with the alined planes vertical on the lower runs of the chains and

with the wide sections below the shafts, said means comprising a disk secured on the shaft at each end of each vane, each disk having a tooth, and a pawl at each end of the narrow section of the alined section of the vane.

4. In a current motor comprising laterally spaced endless chains, shafts connecting the chains at spaced intervals and journaled in the links of the chains at their ends, spaced sprocket wheels for supporting each chain and a vane on each shaft, a disk secured to each shaft adjacent to each chain, each disk having a lug on its periphery, both faces of the lug being radial to the disk, a pawl pivoted to the chain at each side of the shaft and engaging the adjacent face of the lug when the links of the chain are alined, and a spring holding each pawl in engagement with the lug.

5. In a current motor comprising laterally spaced endless chains, shafts connecting the chains at spaced intervals and journaled in the links of the chains at their ends, spaced sprocket wheels for supporting each chain and a vane on each shaft, each shaft having a radial stop adjacent to each chain, a pawl pivoted to the chain on each side of the shaft and engaging the stop when the links of the chain are alined, and a spring for holding each pawl in engagement with the stop.

6. In a current motor comprising laterally spaced endless chains, shafts connecting the chains at spaced intervals and journaled in the links of the chains at their ends, spaced sprocket wheels for supporting each chain and a vane on each shaft, and a pawl pivoted to the chain on each side of the shaft, the shaft having a stop between the adjacent ends of the pawls and engaged thereby when the links of the chain are in alinement.

7. In a device of the character specified, the combination with the laterally spaced endless chains, sprocket wheels for supporting each chain and shafts connected with the chains, of means for permitting angular movement of the shafts as the said shafts pass around the wheels, said means comprising a stop at each end of each shaft, a pair of pawls for each stop, said pawls engaging opposite faces of the stop and being pivoted to the chain on opposite sides of the stop.

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Witnesses:
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SOLON C. KEMON.